

material, but it is perfectly possible for those centers to equip them temporarily for work. That selfish hoarding of material which fears that some one else will get the benefit of it is not only contrary to the real scientific spirit but shows an entire lack of appreciation of the greatness of the field. It must be said that in this country, at least, almost every botanist is ready to open his collections and his library to all who know how to use them, and in so doing feels that he is advancing the interests of botanical science.

WHAT HAS BEEN SAID of co-operation in systematic botany obtains in almost every field of botanical work. It is a question whether any one man should prepare a complete work upon so young a subject as Physiological Botany, for it is impossible for him to examine the whole field, and certainly not in Morphology. Of course reference is not made to brief, compiled texts, but to monographic work. In this connection it may be said that a suggestion was made at the Madison meeting which would be immensely useful if carried out, namely, that botanists arrange for an exchange of index cards, each contributor being assigned certain publications for indexing, the cards being printed in uniform style and sent to all the others. This sort of co-operation would speedily lead to even more complete and effective organization of work.

IT IS CERTAINLY true that the progress of botanical science in this country, and in all countries, will be very much hastened by the completest possible organization of co-operative work.

CURRENT LITERATURE.

A new high school botany.¹

A suitable botanical text-book for high schools seems to be the unsolved problem of publishers and teachers. The attitude of publishers is easy to understand, but that of teachers is not so simple. The only botanists who feel that a suitable book for such a purpose has been written are those who have written them, and the books in their own hands and in those of their own disciples are eminently satisfactory. Every good teacher has his own method, and it is not at all surprising that no one else expresses it exactly. Professor Spalding is an exceptional teacher and has produced an excellent book. It is intended to apply to the present condition of high school equipment and teachers and is surely a vast improvement upon "analysis." The

¹SPALDING, VOLNEY M.—Guide to the study of common plants, an introduction to botany. 12 mo. pp. xxiii+246: Boston, D. C. Heath & Co., 1893.

book is a laboratory guide rather than a text-book, although it constantly associates form with function and gives frequent excellent summaries. It undoubtedly directs to proper methods of observation and seeks to cultivate the true scientific spirit. The serious question will be raised whether such a book should encourage the "actual state of things in most of our preparatory schools" or should show the same schools what the state of things ought to be in order to properly teach botany. The present book begins with an excellent series of studies of the organs of flowering plants; then considers the natural groups, beginning with algæ (*Spirogyra* and *Vaucheria* being used as types), and passes at once to the bryophytes, pteridophytes, and spermatophytes, paying increasing attention to groups as the advance is made. The theory of presentation is of course to cultivate the habit of proper observation with those large plant organs that are commonly known; in other words, to proceed from the complex to the simple. To many botanists this position will seem untenable. In the writer's experience the best results have been obtained by presenting the plant kingdom from the standpoint of its evolution, beginning with units of structure and function. Besides this, the morphology of the flower is impossible of conception except by approaching it by way of the lower groups.

Another question that can be raised concerning the book is the very scant attention it pays to thallophytes. Few types, well selected, are always to be preferred in elementary work to that large array of forms which is so common, forms which stand as so many isolated facts, and when observed, and sketched, and lectured upon are as barren as a sandbank. Too many types are confusing, but surely it would have been well to have introduced some of the great groups of fungi. Not a single reference even to the existence of such plants occurs, so far as we have observed!

All these, however, are questions which concern the theory and practice of the individual teacher. The teachers who use it, and we trust they will be many, will need to make a judicious selection of work from the pages. Blessed is he who knows what to leave out!

But the book is certain to be a very useful one. It is a long step in advance of anything we have for high schools. Professor Spalding is to be congratulated upon his book and the scientific spirit which pervades it.

We note some antiquated references which ought to be corrected in a future edition. Bower's Practical Botany is referred to as "Bower and Vines . . . Parts I and II," when they have long been combined in one volume and Dr. Vines' name has been withdrawn. Un-

derwood's "Our Native Ferns" is referred to as published at Bloomington, Ill., in 1882. This was the second edition, published by the author. But the author has not resided at Bloomington for ten years and the *fourth* edition of the book has lately been issued by Henry Holt & Co.

A course of practical elementary biology.¹

Regarding this book we speak only of the botanical portion. It would have stated better the facts in the case if the author had called this a course of *impracticable* biology. We doubt whether any class of students ever pretended to work through the book. If they have, it surely must have taken some years, with daily work, to accomplish the feat. It strikes us rather as a thorough account of the morphology and physiology of the organisms chosen, interspersed with directions to study certain things or perform some experiments. For example, students are directed (p. 107) to "examine the nuclei of various cells, from the apical cell downward" in picric-acid-hematoxylin specimens of *Chara* in order to study the division of the nucleus! They are also directed (p. 136) to grow fern prothallia and study the history of their development, and likewise the development of the sexual organs. They are also asked to investigate the development of the pollen in *Lamium album*, the origin of the ovule and the structure of the egg apparatus.

The foregoing are only selected as examples of the impossible in an *elementary* course. We have little fault to find with the accuracy or mode of presentation of the matter of the book. It contains many useful hints for advanced students regarding the plants treated, which are yeast, protococcus, bacteria, mucor, penicillium, chara, the male fern, and dead nettle. Teachers also may be able to make use of it in suggesting work for classes. But it is in no sense suitable for beginners, at least in this country. If English students can as babes assimilate such strong meat they must be sons of Anak indeed!

Chapters in modern botany.²

This is one of the most charming and instructive books we have seen. If University Extension had done nothing for the people it could be credited with much good to botanists in bringing about the production of this book, which is one of a series of manuals issued by the Scribners. Its title tells just what it is; not a text book nor a

¹BIDGOOD, JOHN.—A course of practical elementary biology. Crown 8vo., pp. viii + 353. figs. 226. New York, Longmans, Green & Co. 1883. \$1.50.
²GEDDES, PATRICK: Chapters in modern botany. 12mo. pp. xii + 201. figs. 8. New York, Charles Scribner's Sons. 1893.

"botany" but a series of sketches "beginning indeed with some of the strangest forms and processes of the vegetable world [which] it is not proposed to exhibit merely as a vegetable menagerie of rarities and wonders, but for use as a convenient means of reaching . . . some general comprehension of the processes and knowledge of the forms of vegetable life . . . [and] some intelligent grasp of the experimental methods and reasoning employed in their investigation."

These "chapters" treat therefore of pitcher plants and other insectivorous plants, movement and nervous action in plants, the web of life (the relation between plants of different groups), the relations between plants and animals, spring and its studies, leaves, and finally suggestions for further studies.

Those who have read from Professor Geddes before need not be told that the style is charming and his expressions apt and striking. We can not begin to quote these; there is no end. We can only say that no teacher or lover of botany can in justice to himself fail to read these pages. We would also that this book might come into the hands of all the multitude to whom botany is yet mere herborization and the botanist a harmless gatherer of simples. To all it is most cordially commended as fully reaching its declared purpose.

Minor Notices.

IN CONNECTION with the botanical exploration of Costa Rica (*Primitive Floræ Costaricensis*, Durand and Pittier), Dr. F. W. Klatt has just published the *Compositæ*. Like other Central American states, the *Eupatoriaceæ* afford the most abundant display, the genus *Eupatorium* being represented by thirty species, ten of which are described as new. Fourteen other species are described as new, distributed among *Senecio*, *Mikania*, *Viguiera*, and several other genera. The total number of the list is 165.

TO THOSE interested in Diatoms, the volume¹ by Mills and Deby will be welcome. Some seventy-five pages are given to general information about diatoms, which might be much better without being first class, followed by analytical keys of families and genera (species not being considered), and rather incomplete directions as to collecting, mounting, and photographing. The rest of the book (about 165 pp.) which is far the most important, indeed the indispensable, part of it, consists of the bibliography of the group, by Julien Deby.

PART III of John Donnell Smith's "Enumeratio Plantarum Guat-

¹MILLS, F. W. and DEBY, JULIEN.—An introduction to the study of the Diatomaceæ, with a Bibliography. 8vo. pp xi. + 243: London, Iliffe & Son; Washington, The Microscopical Publishing Co., 1893.

emalensium" has just appeared. The very complete way in which Captain Smith is bringing to light this interesting flora leaves little to be desired. The explorations are thorough, the notes full, the specimens abundant. The material is a pleasure to study and to receive into the herbarium. It is fortunate that such collectors as the missionary, Theophilus Heyde, and his grandson, Ernest Lux, can be called upon. In the present distribution specimens also from W. C. Shannon and M. M. Macomb appear.

A STUDY of the venation of *Salix* has been published by Dr. N. M. Glatfelter and distributed in advance of the fifth annual report of the Mo. Bot. Garden. The species considered are those of Gray's Manual, and the author has provided valuable supplemental aid in their determination. Remembering how frequently leaf characters are the only ones obtainable in this genus, and also how important a group it is to the paleobotanist, venation characters should be made to reveal all they can. The species are separated into three groups, (1) those with secondary veins regular, (2) those with secondaries partly irregular, and (3) those with secondaries irregular. The secondaries have to be used, as the primaries are regular almost without exception. Three artotype plates illustrate the paper, having been photographed from the leaves by transmitted light.

"FOREST INFLUENCES" is the subject of Bulletin no. 7, from the Forestry Division of the U. S. Department of Agriculture. Mr. Fernow very conveniently gives a summary of conclusions in the introductory pages, some of which are as follows: *Influence on meteorological conditions*, (1) the general influence of the forest on soil temperatures is a cooling one; (2) the annual range of air temperature is smaller in the forest than in the open; (3) the mean temperature of the air in the tree-tops is rather higher than over open fields; (4) the forest affects the temperature just as any collection of inorganic obstacles to sunshine and wind, but as an organic being the forest may be also an independent source of heat; (5) the annual evaporation within the forests is about one-half of that in the open field. *Influence on climate of surrounding country*, (1) can only take place by diffusion of vapor of transpiration, (2) local air currents are induced by difference of temperatures of air within and without the forest, (3) the general air currents are cut off entirely in their lower portions by the forest. *Influence on water and soil conditions*, (1) deforestation augments and accelerates soil evaporation, and thus affects unfavorably the size and continuity of springs, (2) snow is held longer in the forest and its melting retarded, (3) surface drainage is retarded by the uneven forest floor, (4) the well-kept forest floor prevents erosion of soil better than even the close sod of a

meadow. *Sanitary influence*, (1) the claimed influence of greater purity of air does not seem to be significant, (2) protection against sun and wind and consequent absence of extreme conditions seem favorable, (3) the soil conditions of the forest are unfavorable to the production and existence of pathogenic microbes.

THE REPORT of the U. S. Microscopist for 1892 is devoted principally to edible and poisonous mushrooms. There are two other pamphlets sent out with it, being reprints of such parts of the reports for 1885 and 1890 as relate to edible fungi. They contain some very good colored plates and some serviceable information, although as contributions to science they do not rank high, and the accuracy of the statements is not always above criticism.

OPEN LETTERS.

A suggestion in terminology.

The members of the Madison Botanical Congress through their committees on the terminology of morphology and of physiology expressed a desire for some general term that should be applied to the cell which arises from the fusion of two gametes. The word *zygote* has come to refer only to the product of fusing isogametes, just as *oospore* (in the etymologically correct use) refers to the fusion product of heterogametes. For the general term, after much research and deliberation, the compound *syngamete* is offered. The derivation is apparent, and by preserving the word *gamete* as an integral part of the term, there is little difficulty in respect to comprehensibility. Some such word seems better than one in which the idea of fusion alone should be expressed, for such a word would find proper use in the morphology and physiology of Mycetozoa. But in these it is very doubtful indeed whether the fusing *plasmodiogens* are gametic in their nature. The term is herewith offered for criticism.—CONWAY MAC MILLAN, *University of Minnesota, Minneapolis.*

Introduced plants in the arid region.

I forward the inclosed list to show that though we dwell in the arid region we can show a very fair assortment of introduced plants and shrubs.

The list is made out from what grows on my two lots 100 by 300 feet in our village. The lots are bisected by a small river, the Vasquez Fork of the Platte, and is blessed with abundant moisture in part.

We are in latitude $39^{\circ} 45' 24''$ north with an altitude of 5,660 feet above the sea. Our yearly rain-fall and melted snow varies from thirteen and one-half to eighteen inches.

Stachys and *Deutzia* are from Japan, and present no trouble in naturalization, if I permit them to extend.